

In the claims:

This listing of claims will replace all prior versions, and listing, of claims in the application.

1. (Previously Presented): A computer-based system for replicating data over a network, comprising:

a master server containing an original copy of the data, said master server comprising:

a master user layer to start a data replication process by calling a start method, the master user layer further adapted to send information relating to the original copy of the data;

a master service layer, containing the start method to receive the call from the master user layer and the information relating to the original copy of the data, the master service layer and to create and send a data replication packet containing at least some of the information relating to the original copy of the data;

a slave server to store a copy of the data from the master server, the slave server comprising:

a slave service layer to receive the data replication packet from the master service layer and process the data replication packet and to send information relating to the data replication packet; and

a slave user layer to receive the information relating to the data replication packet from the slave service layer and to store the information in the data replication packet;

wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer, wherein the one-phase update is done to multiple slave servers concurrently.

2. (Original): A system according to claim 1, wherein said master user layer is in communication with at least one of a master user and a master user device

3. (Previously Presented): A system according to claim 1, wherein said master user layer sends

information relating to the original copy of the data in the form of a delta, the delta containing information relating to changes between a previous state and the current state of the original copy of the data.

4. (Previously Presented): A system according to claim 1, wherein said master user layer updates the original copy of the data.

5. (Previously Presented): A system according to claim 1, wherein said master user layer sends a roll-back message indicating that a change to the original copy of the data should not be replicated on a slave server.

6. (Previously Presented): A system according to claim 1, wherein said master user layer sets a timeout value for the replication.

7. (Previously Presented): A system according to claim 1, wherein said master user layer creates a delta between the present state of the original copy of the data and the prior state of the original copy of the data.

8. (Previously Presented): A system according to claim 1, wherein said master user layer creates a delta between the present state of the original copy of the data and a previous state of the original copy of the data.

9. (Previously Presented): A system according to claim 1, wherein said master user layer generates a unique version number for each state of the original copy of the data.

10. (Previously Presented): A system according to claim 1, wherein said master service layer multicasts the data replication packet.

11. (Previously Presented): A system according to claim 1, wherein said master service layer heartbeats the data replication packet.

12. (Previously Presented): A system according to claim 1, wherein said master service layer includes a version number in the data replication packet.

13. (Previously Presented): A system according to claim 1, wherein said master service layer includes information necessary to update the copy of the data on the slave server to the current state of the original copy of the data.

14. (Previously Presented): A system according to claim 1, wherein said master service layer creates and sends a data replication packet comprising a delta.

15. (Previously Presented): A system according to claim 1, wherein said master service creates and sends a data replication packet comprising a delta between successive states of the original copy of the data.

16. (Previously Presented): A system according to claim 1, wherein said master service creates and sends a data replication packet comprising a delta between arbitrary states of the original copy of the data.

17. (Previously Presented): A system according to claim 1, wherein said master service layer requests a delta from the master user layer.

18. (Previously Presented): A system according to claim 1, wherein said master service layer sends a commit message to a slave service layer.

19. (Previously Presented): A system according to claim 1, wherein said master service layer heartbeats a commit message to a slave service layer.

20. (Previously Presented): A system according to claim 1, wherein said master service multicasts a commit message to a slave service layer.

21. (Previously Presented): A system according to claim 1, wherein said master service layer

sends an abort message to a slave service layer.

22. (Previously Presented): A system according to claim 1, wherein said master service layer heartbeats an abort message to a slave service layer.

23. (Previously Presented): A system according to claim 1, wherein said master service layer multicasts an abort message to a slave service layer.

24. (Original): A system according to claim 1, wherein said slave user layer is in communication with at least one of a slave user and a slave user device.

25. (Previously Presented): A system according to claim 1, wherein said slave user layer checks the current version number of data stored on the slave server.

26. (Previously Presented): A system according to claim 1, wherein said slave user layer commits information relating to the data replication packet to the data stored on the slave server.

27. (Previously Presented): A system according to claim 1, wherein said slave user layer aborts an update to the data stored on the slave server.

28. (Previously Presented): A system according to claim 1, wherein said slave user layer processes a prepare request contained in the data replication packet.

29. (Previously Presented): A system according to claim 1, wherein said slave user layer sends a response to the slave service layer relating to a prepare request contained in the data replication packet.

30. (Previously Presented): A system according to claim 1, wherein said slave user layer persistently caches data on a local disk.

31. (Previously Presented): A system according to claim 1, wherein said slave user layer

updates the version number of the copy of the data on the slave server.

32. (Previously Presented): A system according to claim 1, wherein said slave service layer requests a delta from the master service layer.

33. (Previously Presented): A system according to claim 1, wherein said slave service layer requests the current version number of the data stored on the slave server from the slave user layer.

34. (Previously Presented): A system according to claim 1, wherein said slave service layer sends a commit message to the slave user layer.

35. (Previously Presented): A system according to claim 1, wherein said slave service layer sends an abort message to the slave user layer.

36. (Previously Presented): A computer-based method for replicating data from a master server to a slave server, comprising:

- sending a start call from a master user level to a master service level on a master server, the start call containing information relating to the current state of master data on the master server;

- sending the information to a slave service layer on a slave server, the slave service layer adapted to check a slave user layer on the slave server to determine whether slave data on the slave server has the current state;

- sending a request for a delta from the slave service layer to the master service layer, the master service layer adapted to request and receive a delta from the master user layer;

- sending a delta from the master service layer to the slave service layer, the delta containing the information necessary to bring the slave data up to the current state, the slave service layer adapted to process the delta and send the information to the slave user layer; and
 - updating the slave data using the slave user layer;

- wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is

done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

37. (Original): A method according to claim 36, further comprising:

determining a version number for the current state of the data using the master user layer.

38. (Original): A method according to claim 36, further comprising:

sending the information to the slave service layer by multicasting.

39. (Original): A method according to claim 36, further comprising:

sending information to the slave service layer, the information comprising a version number for the current state of the master data.

40. (Previously Presented): A computer-based method for replicating data from a master server to a slave server, comprising:

sending a new delta from a master user level to a master service level on a master server, the delta containing information relating to a change from the prior state to the current state in master data stored on the master server;

sending the new delta from the master service layer to a slave service layer on a slave server, the slave service layer adapted to check a slave user layer on the slave server to determine whether the slave data on the slave server has the current state;

sending a request for a syncing delta from the slave service layer to the master service layer, the master service layer adapted to request and receive a syncing delta from the master user layer, the syncing delta containing information necessary to update the slave data to the prior state of the master data;

sending the syncing delta from the master service layer to the slave service layer, the slave service layer adapted to process the delta and send the information to the slave user layer to be committed to the slave data; and

committing the information in the new delta to the slave data using the slave user layer;

wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

41. (Previously Presented): A computer-based method for replicating data from a master server to a slave server over a network, the method comprising the steps of:

- sending a version number from a master service layer to a slave service layer relating to the present state of the original copy of the data on the master server;

- allowing a slave user layer to determine whether the data on the slave server has been updated to correspond to the version number; and

- requesting a delta be sent from the master service layer to the slave service layer if the data on the slave server does not correspond to the version number;

- wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

42. (Original): A method according to claim 36, further comprising:

- allowing the slave user layer to persistently cache the data on a local disk for each slave server.

43. (Original): A method according to claim 36, further comprising:

- allowing the master user layer to determine a unique version number for the current state of the data on the master server.

44. (Original): A method according to claim 36, further comprising:

including data with the version number that is necessary for a slave user layer to update the data on a slave server.

45. (Original): A method according to claim 36, further comprising:

committing the data necessary to update the slave server as soon as it is received by the slave user layer.

46. (Previously Presented): A computer-based method for replicating data over a network including a master server and at least one slave server, the method comprising the steps of:

sending a packet of information from a master service layer to a slave service layer on each slave server on the network, the information relating to a change in the data stored on the master server and containing a prior version number for the prior state and a new version number for the new state of the data, the information further relating to previous changes in the data and a previous version number for each previous change;

allowing a slave user layer on each slave server to determine whether the data on the slave server corresponds to the prior version number contained in the packet;

allowing each slave user layer to commit the packet of information if the data on the slave server corresponds to the prior version number contained in the packet, the commit also updating the version of the slave server to the new version number; and

allowing each slave user layer not corresponding to the prior version number to request that a delta be sent from the master service layer to the slave service layer corresponding to that slave user layer, the delta containing the information necessary to update the slave to the prior version number before the slave service layer commits the packet of information;

wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

47. (Previously Presented): A computer-based method for replicating data from a master

server to at least one slave server over a network, the method comprising the steps of:

- sending a packet of information from a master service layer on the master server to the user service layer on a slave server, the information relating to a change in the data stored on the master server and containing a version number for the present state of the data;

- allowing the slave user layer on the server to determine whether the slave server has been updated to correspond to the version number contained in the packet, and to further determine whether the slave user layer can process the packet of information if needed to update to correspond to the version number contained in the packet;

- sending a signal from the slave service layer to the master service layer, the signal indicating whether the slave server needs to be updated and whether the slave server can process the update;

- sending a response signal from the master service layer to the slave service layer indicating whether the slave user layer should commit to the information contained in the packet; and

- committing the packet of information to the slave server if so indicated by the response signal;

wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

48. (Previously Presented): A computer-readable medium, comprising:

- means for sending a version number from a master service layer to a slave service layer relating to the present state of the original copy of the data on the master server;

- means for allowing a slave user layer to determine whether the data on the slave server has been updated to correspond to the version number; and

- means for requesting a delta be sent from the master service layer to the slave service layer if the data on the slave server does not correspond to the version number;

- wherein based on the type of delta, a one-phase update is done with the slave service

layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

49. (Previously Presented): A computer program product for execution by a server computer for replicating data from a master server to a slave server over a network, comprising:

- computer code for sending a version number from a master service layer to a slave service layer relating to the present state of the original copy of the data on the master server;

- computer code for allowing a slave user layer to determine whether the data on the slave server has been updated to correspond to the version number; and

- computer code for requesting a delta be sent from the master service layer to the slave service layer if the data on the slave server does not correspond to the version number wherein based on the type of delta, a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer and wherein the one-phase update is done to multiple slave servers concurrently.

50. (Previously Presented): A computer-based system for replicating data over a network, comprising:

- means for sending a version number from a master service layer to a slave service layer relating to the present state of the original copy of the data on the master server;

- means for allowing a slave user layer to determine whether the data on the slave server has been updated to correspond to the version number; and

- means for requesting a delta be sent from the master service layer to the slave service layer if the data on the slave server does not correspond to the version number;

- wherein a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master

service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.

51. (Previously Presented): A computer system comprising: a processor;

object code executed by said processor, said object code configured to:

send a version number from a master service layer to a slave service layer relating to the present state of the original copy of the data on the master server;

allow a slave user layer to determine whether the data on the slave server has been updated to correspond to the version number; and

request a delta be sent from the master service layer to the slave service layer if the data on the slave server does not correspond to the version number;

wherein a one-phase update is done with the slave service layer requesting a delta from the master service layer asynchronously; or a two-phase update is done with the slave service layer receiving a delta from the master service layer, sending a prepared signal to the master service layer and then committing the delta if a commit signal is received from the master service layer wherein the one-phase update is done to multiple slave servers concurrently.